CLAIMS:

We claim:

1. A channel assignment scheme for a node comprising:

assigning a first channel to an uplink for a node;

assigning a second channel for a downlink for a node; and

maintaining the first channel and the second channel distinct from uplink channel of an upstream node. .

2. The method of Claim 1, wherein each interface is half-duplex.

3. The method of Claim 1 wherein the channels are frequency channels.

4. The method of Claim 1 wherein the channels are different spreading codes in a spread-spectrum CDMA system.

5. The method of Claim 1 wherein the channels are different polarizations of the transmitted waveform.

6. The method of Claim 1 wherein the channels are different spatial signatures as determined by a smart antenna or adaptive antenna array at the receiver.

7. The method of Claim 1, further comprising:

assigning of the first channel and the second channel for the node based on a number of hops from the node to a distinguished node.

8. The method of claim 7, wherein there are multiple downlink nodes and the multiple downlink nodes use multiple downlink channels.

9. The method of Claim 7 wherein the number of hops is determined from information carried in the routing packets.

10. The method of Claim 9, wherein the routing information is propagated in the network on some or all of the channels available in the system.

11. The method of Claim 9, wherein the routing information is propagated in the network on a dedicated channel.

12. The method of Claim 1 wherein the uplink channel of the node is assigned by the default gateway of the node.

13. The method of Claim 12, wherein assigning the downlink channel for a node comprises:

determining a plurality of potential channels for communication;

sending a reservation packet to trigger testing of each of the plurality of potential channels; and

determining a best channel based on responses to the reservation packet.

14. The method of Claim 13 wherein testing comprises:

each downstream node sending a plurality of packets to the node; and

evaluating a channel with the best link quality..

15. The method of Claim 14 wherein link quality is estimated by the throughput on the link.

16. The method of Claim 14 wherein link quality is estimated by measuring the packet error rate on the link.

17. The method of Claim 14 wherein link quality is estimated by the signal-to-noise ratio observed on the link.

18. The method of Claim 14 wherein link quality is estimated by the latency observed on the link.

19. A method to determine a quality of a link comprising:

sending a predetermined number of packets to an originating node in response to a reservation packet; and

deducing, at the originating node, a packet error rate based on a number of packets received without error; and

assigning best quality channel to the downstream connection from the originating node based on the packet error rate.

20. The method of claim 19, wherein the best quality channel comprises a plurality of downlink channels, and each downstream connection to a downstream node uses one of the plurality of downlink channels.

21. A method to determine a quality of a link comprising:

sending a predetermined number of packets to an originating node in response to a reservation packet; and

deducing, at the originating node, a throughput rate based on the packets received without error; and

assigning a best quality channel to the downstream connection from the originating node based on the observed throughput.

22. The method of claim 21, wherein the best quality channel comprises plurality of downlink channels, and each downstream connection to a downstream node uses one of the plurality of downlink channels.

23. The method of claim 22, wherein the determination is performed periodically, and on all downstream links from a given node and on all available channels in order to determine the choice of channel or channels for the downlink for which the best link quality is achieved.

24. A method to allocate communication channels that results in enhanced resistance to external interferers in a wireless mesh network comprising:

periodically evaluating a downstream channel by receiving a plurality of packets from each downstream node for each of a plurality of channels; and

selecting as the downstream channel a best of the plurality of channels based on link-quality.

25. The method of Claim 24, wherein the method results in a channel allocation for the system that eliminates interference between adjacent links or next-to-adjacent links.

26. The method of Claim 24, wherein the communications channel to be used on a link (connecting two nodes) is assigned by the node that is at a smaller number of hops to the access point.

27. The method of Claim 24, wherein all the links comprising the downlink from a given node are assigned to the same channel.

28. The method of Claim 24, wherein the links comprising the downlink from a given node may be assigned to different channels.

29. The method of Claim 24, wherein the channel allocations for the system may change in response to the presence of an interferer or jammer transmitting on one or more of the channels used by the system.

30. The method of Claim 24 wherein the presence of an interferer or a jammer is inferred based on the link quality observed on each link.